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A PROBABLE ORIGIN OF THE RINGS OF SATURN.

By ALBERT B. REAGAN.

IN the Student's Reference Work Cyclopaedia, volume 2, page 1140, is this description of Saturn:

"Saturn, with its system of rings, is conceded to be one of the most superb objects in the heavens. Although the diameter of the planet is only 73,000 miles, the outer ring is no less than 168,000 miles across. Two rings have been known for a long while, but a third ring was discovered by Bond in 1850. Pierce and Maxwell have proved that these rings are made up of discreet particles, and that the rings, therefore, are neither solid nor liquid. The planet has eight satellites, discovered between the years 1665 and 1848."

Saturn's rings are kept in place by the same force as are its satellites. But how did they get in their present position, and where did they come from?

Some astronomers—practically all, in fact—no doubt believe that each ring of Saturn was left in its present position when the planet cooled to a less size than the respective rings; and many believe that probably these rings may develop into moons in time by the segregation of the particles of each respective ring. But may it not be probable that they had a different origin? May they not have been formed by titanic volcanic eruptions of that planet? Let us compare some of the most violent volcanic eruptions of the earth in our own time, and then see if the same phenomena, only on a more gigantic scale, might not have occurred on Saturn and produced the rings.

ALASKAN VOLCANIC DISTURBANCES.

In the recent violent volcanic disturbances in Alaska it is a known fact that volcanic ashes were hurled 2000 miles, and the finer dust particles were carried in the atmosphere completely around the earth. They were observed in Algiers and elsewhere. It is also even believed by some observers that the mean temperature of the earth's surface was lowered for a time by these dust particles being suspended in the upper atmosphere.

THE ERUPTION OF MOUNT PELEE.

"The eruption of Pelee, that in its intensity, short duration and annihilating power must be ranked among the great ca-

tastrophes recorded in history, establishes a new chapter in the science of vulcanology, and illuminates a new page in the physics of the globe. A mountain hardly more than Vesuvian proportions, without lava discharge, without accompanying earthquake disturbances, sends to utter destruction, in a few seconds, a town and suburbs with a population conservatively estimated at 30,000, of whom only two escaped and but one survives. Eighteen or more vessels in the harbor were destroyed by burning or capsizing, and most of the human freight which they carried shared their destruction, An extensive region of fields and forest lands was blistered, singed or turned into a desert, while torrential flows of mud and giant boulders annihilated settlements lying beyond the direct action of the volcano itself. . . . This is the story of the catastrophe (cataclysm) whose exact nature is unique in the annals of science.”—Anglo Helptin, *Fortnightly Review*, pp. 475, 476.

THE CARIBBEAN CATAclySM.

“The explosion of Mount Pelee, on the Island of Martinique, on May 8 (1902), whereby the city of St. Pierre was in a few seconds completely destroyed and 30,000 or more people were killed, is one of the most extraordinary manipulations of volcanic power that have ever been known. . . . The ‘volcanic blasts’ of hot gases and superheated steam, which appear to have been the chief agents in the destruction of life, are unprecedented in the history of such disasters.”—Garrett P. Serviss, *Cosmopolitan*, July, 1902, p. 357.

I will also add that at the time of the eruption of Mount Pelee I lived at Cibicu, Fort Apache Indian Reservation, Arizona, and there red sunsets were distinctly seen as a result of the dust particles hurled from Pelee into the upper atmosphere. Furthermore, on May 9, before I had heard of the volcanic disturbance, a sheet spread out on the grass in my yard was noticed to have fine dust particles on it, which proved to be volcanic ashes. I also saw in some paper later that such dust was also detected about Phoenix, Ariz.

THE ERUPTION OF KRAKATOA.

“The first great (ocean) waves on the evening of the 26th and the early morning of the 27th (of August, 1883) were caused by a portion of Krakatoa being shot out northward eight miles and dropped where we now have Steer’s Island;

while the appalling detonation in that forenoon and the greater wave accompanying it resulted, perhaps, from that still more titanic effort which lifted the greater portion of Krakatoa—several thousand million cubic yards of material—out of its 170-fathom root, hurled it through the air over Lang Island, and plunged it into the sea some seven miles to the northeast, where Calmeyer Island now blocks the channel, which marines have known so long as East Passage. . . . To what height the supreme outburst propelled the smoke, dust, and the lighter portion of matter, it is impossible at present to estimate. Mr. Whymper saw Cotapaxi, in by no means one of its extraordinary expirations, eject a column over 20,000 feet in height; but many multiples of this distance will doubtless be required to measure the spire that was shot skyward on the afternoon of August 27 last. At least it rose so high that months have been required for it to descend.”—*Popular Science Monthly*, vol. 25, pp. 373, 374, 375.

In speaking of the eruption of Krakatoa, Johnson's Mineral Encyclopedia (vol. V, p. 26) says: “The eruption began in May (1883) and continued till August 27, when a large part of the island was blown away and fragments of pumice and dust thrown to a height, by estimate, of twenty miles. Gaining the region of the upper air currents, the dust was carried around the entire earth, and produced wonderful twilight glows for many months. The sound of the explosion was heard at a distance of 2247 miles. The waves produced in the air traveled four and one-half times around the world. Sea waves fifty feet high swept the neighboring shores, and similar waves were observed on distant coasts over half of the globe. One hundred sixty-three villages were destroyed and 36,380 human beings perished.”

Could not the discreet particles forming Saturn's rings have been hurled into space from the planet in some tremendous volcanic cataclysm in the same way as Krakatoa hurled her dust particles beyond the upper region of our atmosphere, so that it took it two years to return to the earth again. If such occurred, the rings would, of course, be distant from the planet in proportion to the immensity of the eruption that hurled the particles of the respective rings into space; and if hurled far enough into space, gravity and counter forces would prevent them from returning to Saturn. The motion of the planet

would tend to have them form as bands over the equatorial region, as I understand they do. The eruption of Krakatoa is one of the very insignificant eruptions of our earth, if all geological time is considered; yet its immensity is beyond comprehension. Saturn, without its rings, has nearly nine times the bulk of our earth, and probably even more than double that in its tendency to stupendous volcanic activity.